

REMARKS

Claims 1, 24, 31, and 34 have been amended, and claims 30 and 33 have been canceled. Claims 1-29, 31-32 and 34-35 are now pending in this Application. Claims 1 and 24 are independent claims.

Claims 1 and 24 have been amended to incorporate the subject matter of cancelled dependent claims 30 and 33 respectively, and thus claims 1 and 24 are now fully equivalent to claims 30 and 33 as previously presented. Thus, the amendments herein do not necessitate any new grounds of rejections such that a subsequent office action could properly be made final under MPEP § 706.07(a).

Rejections under §102 and §103

Claims 1-4, 8-10, 13, 18-25 and 27-29 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. 2002/0172253 (Vetrovec). Claims 1, 24, 30-35 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. 5,210,768 (Seguin). Claims 5, 15, 17, 26, 14, 16, 6, 7, 11 and 12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Vetrovec as applied to previous claim 1 in combination with one of several other cited references. These rejections are respectfully traversed. The claims are in allowable condition.

The rejection under 35 U.S.C. §102(e) based on Vetrovec is seen to no longer be applicable due to the amendment of claims 1 and 24 herein. This amendment is not to be seen as acquiescence to the rejection or any of the factual assertions in the Office Action. The views expressed in the previous response submitted November 18, 2005 are still adhered to, and the right to pursue claims of similar scope to original claims 1 and 24 is expressly reserved. Nonetheless, claim amendments have been made in the interest of narrowing the issues and more demonstratively distinguishing the art of record in order to advance prosecution toward early allowance. Accordingly, favorable consideration of the amendments and remarks herein is respectfully requested.

The rejection of prior claims 31 and 34 based on Seguin is assumed to now be applicable to claims 1 and 24 as amended herein. These rejections are respectfully traversed.

Claim 1 as amended is directed to system for coherent beam combination that includes, among other elements, the following:

...

wherein a first electromagnetic field produced by a first gain medium of said at least two gain media propagates through a portion of a second gain medium of said at least two gain media after one or more roundtrips within said unstable resonator; wherein said first electromagnetic field is in-phase with a second electromagnetic field produced by said second gain medium,

and wherein the at least two gain media are placed in a plane transverse to a longitudinal axis of the unstable resonator, each gain medium being positioned an equal distance away from and on a different side of the longitudinal axis of the unstable resonator.

Thus the system of claim 1 requires both (1) that the gain media are placed in a plane transverse to, and an equal distance away from, a longitudinal axis of the unstable resonator, and (2) that a first electromagnetic field produced by the first gain medium propagates through a portion of the second gain medium media after one or more roundtrips within the unstable resonator and is in-phase with a second electromagnetic field produced by the second gain medium.

The Examiner is referred to Figures 1-2 of the present application for a description of an embodiment of claim 1. The two gain media 108a and 108b are placed side-by-side in a plane transverse to the longitudinal axis of the resonator formed by mirrors 104 and 106 along with gain media 108, and electromagnetic field 108b' generated by gain media 108b partially overlaps the gain media 108a. As described in the text, a similar diagram can be drawn for an independent

electromagnetic field generated by gain media 108a, and the resonator is designed such that the two electromagnetic fields are combined in-phase within each gain media 108.

Seguin, per its Abstract, is seen to show a laser system featuring a plurality of thin solid-state gain channels mounted radially about a common axis. These gain channels may be excited by multiple flashlamps or by extended arrays of light-emitting-diodes. The gain channels are also mounted in a parallel configuration within a single optical resonator and thereby share a common cavity mode. The resonator may be a stable resonator, a conventional unstable resonator, or a toric resonator. Each resonator configuration may be externally phase-locked via external reference oscillator injection or by self-injection via an internally generated master oscillator.

The configuration of Figure 5 of Seguin, which is referred to in the Office Action, is essentially the same as that of Figure 2 except for also including a cylindrical solid state gain rod 28 at the centerline of the optical cavity. The description of Figure 2 is reproduced below (emphasis added):

In FIG. 2, the optical resonator is defined by convex mirror 16 and concave mirror 20 disposed at opposite ends of the gain sections. Mirror 16 includes an annular recess 25 with slanted annular edges forming an axicon that guides the light from the central region at and adjacent the central axis into the gain channels. An annular mirror surface 21 and conical mirror surface 23 form part of an output axicon 22 placed adjacent the mirror 20. The output axicon 22 may be formed from an integral unit with slots cut at the appropriate locations for the individual beamlets output from the gain channels, in accordance with design principles well known in the art. In the normal unstable resonator configuration of FIG. 2, the cavity rays (illustrated by the lines 15) gradually "walk" radially outward towards the outer edges of the mirrors. Consequently, optical energy is extracted at the outer periphery of the secondary resonator mirror 20 as individual beamlets, which are then compacted into a single beam 24, via the annular mirror 21 and conical mirror 23 of output axicon 22.

According to the above description and Figures 1-2 of Seguin, it should be clear that each cavity ray 15 in Seguin does not pass through more than one of the gain "channels" or elements 10. Each gain element 10 has an elongated

-10-

cross section extending radially away from the center line of the cavity, and there is but one such gain element 10 along any particular radial path. If each cavity ray 15 gradually walks radially outwardly as described above, then it obviously encounters only one of the radially arranged gain elements 10. Moreover, beams are described as being combined only by the output axicon 22, not within any of the gain elements 10. Thus, contrary to the assertion in the Office Action, there is no electromagnetic field produced by "gain medium one" that then proceeds to "gain medium two" (taking each of these terms to refer to a gain element 10 in Seguin). Specifically, Seguin lacks the combination set forth in claim 1 of (1) gain media placed in a plane transverse to, and at an equal distance away from, a longitudinal axis of the unstable resonator, and (2) a first electromagnetic field produced by a first of the gain media that propagates through a portion of a second of the gain media after one or more roundtrips within the unstable resonator and is in-phase with a second electromagnetic field produced by the second gain media. Because Seguin lacks at least these elements of claim 1, Seguin cannot anticipate claim 1 under 35 U.S.C. § 102(b).

The remaining claims incorporate, either directly or indirectly, the above-recited elements of claim 1, and thus the remaining claims are also seen to be not anticipated by Seguin nor rendered obvious by any combination of Seguin with other art of record. Accordingly, it is believed that all the claims of this application are allowable in view of Seguin and the other art of record. Favorable action is respectfully requested.

Applicant hereby petitions for any extension of time which is required to maintain the pendency of this case. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50-3661.

-11-

If the enclosed papers or fees are considered incomplete, the Patent Office is respectfully requested to contact the undersigned collect at (508) 616-2900, in Westborough, Massachusetts.

Respectfully submitted,



James F. Thompson, Esq.  
Attorney for Applicant(s)  
Registration No.: 36,699  
Bainwood, Huang & Associates, L.L.C.  
Highpoint Center  
2 Connector Road  
Westborough, Massachusetts 01581  
Telephone: (508) 616-2900  
Facsimile: (508) 366-4688

Attorney Docket No.: 1002-009.004

Dated: August 8, 2006